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«KHARKIV POLYTECHNIC INSTITUTE»

O. Gavrys, O. Gaponenko, O. Sergienko

**RESOURCE AND COST MANAGEMENT:  
LECTURE NOTES**

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G-12

Reviewer :

**Gavrys O.M.**

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Educational lecture notes contains the fundamentals of a general theory of resource and cost management, classification of costs for decision-making, methods of constructing cost functions of the enterprise, analysis of the relationship between costs, volume and profits, the methods and systems of cost calculation, principles of cost management system.

Designed for students directions 073 «Management» and 076 «Entrepreneurship, trade and exchange activity»

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## INTRODUCTION

The main goal of the discipline Resource and cost management – the necessity of formation in students and future specialists theoretical, methodological foundations and practical aspects of managing resources and costs.

In the process of studying the discipline students form skills of economic focus in the activities of various organizational-legal forms of management; develops a set of analytical, prognostic and innovation abilities, which are necessary for future entrepreneur to calculate the expected positive financial results, strategy of development of business activity, performance and competitiveness of the enterprise.

## **Topic 1. Object of Resource and cost management (RCM).**

### **Basic concepts of RCM in economics.**

#### **Topic list**

1.1 Definition of Resource and Cost Management (RCM).

1.2 Basic concepts of RCM in economics.

#### **1.1 Definition of Resource and Cost Management (RCM).**

**RCM** is the process of planning and controlling the budget of a business. Cost management is a form of management accounting that allows a business to predict impending expenditures to help reduce the chance of going over budget.

The *techniques and process of ascertaining cost* involve three steps:

- Collection of expenditure or cost data
- Classification of expenditure as per cost elements, function, etc.
- Allocation and apportionment of expenditure to the cost centres and cost units.

The system accumulates and classifies expenditure according to the elements of costs, and then, the accumulated expenditure is allocated and apportioned to cost objects i.e. cost centres and cost units.

Many businesses employ cost management plans for specific projects, as well as for the over-all business model. When applying it to a project, expected costs are calculated while the project is still in the planning period and are approved beforehand. During the project, all expenses are recorded and monitored to make sure they stay in line with the cost management plan. After the project is finished, the predicted costs and actual costs can be compared and analyzed, helping future cost management predictions and budgets.

#### **1.2 Basic concepts of RCM in economics.**

##### **The stages of development the theory of cost management**

1. Boiler method (until the second half of the XIX century).

*Characteristic:* taking into account all funds spent on the production, regardless of the sizes of their use and purpose, then these costs are distributed in proportion to the adopted base

2. Method of Fels and Gark (the second half of the XIX century).

*Characteristic:* the main innovation was that all costs were divided into fixed and variables.

3. Method of John Mannom (1891).

*Characteristic:* introduction the concept of fixed or overhead costs, i.e. costs that cannot be directly attributed to unit.

4. Method of Alexander Gamilton (the beginning of the 20th century).

*Characteristic:* it was proposed to divide the production area by several production centers and allocate overhead costs between them on the basis of proven them machine hours.

5. The concept of direct costing (Jonathon Garrison, the middle of the 20th century).

*Characteristic:* the concept is based on the exclusion of indirect costs associated with the period, and management conditionally-variable costs.

6. System standard-cost (Frederick Taylor, 1936).

*Characteristic:* there is a system of comparison of actual costs with standardized. The main function is the control and management of costs, not accounting.

7. The concept of responsibility centers (John A. Higgins, 1952 ).

*Characteristic:* the main idea of the method is the dependence of the degree of responsibility of certain individuals for the financial results of their work.

8. Organization system KANBAN (Thomas Ono, early 70-ies of the 20th century).

*Characteristic:* the substance of the method consists in the rational organization of production and effective personnel management.

**Questions:**

1. Select the most suitable answer in each of the following multiple choice questions:

The main purpose of cost management is to

- (a) Maximise profits.
- (b) Provide information to management for decision making.
- (c) Help in fixing selling price.

2. Which of the following statements are true?

- (a) RCM can be used only in manufacturing organisation.
- (b) Costing techniques refer to those used for analysis and interpretation of cost data.
- (c) All costs are controllable.

3. What are the basic objectives of RCM?

4. The reasons for the lack of effective cost management system in Ukrainian enterprises.

5. The role and importance of RCM in a market economy.

**References:** Main [4, 5, 7]; Additional [1, 2, 7]; Information resources.

## **Topic 2. RCM at the enterprise.**

### **Topic list**

2.1 Cost department and its relationship with other departments

2.2 Installation of costing system

### **2.1 Cost department and its relationship with other departments**

In the organisation chart, the cost department occupies a very important position. The cost department is responsible

- (a) for keeping records connected with material, labour and expenses
- (b) for analysing all costs of manufacturing, marketing and administration
- (c) for issuing control reports and data for decision making to the executives, department heads, section heads and foremen.

When management is provided with useful reports, they assist in controlling and improving cost and operations. Such information data are, again, used for making new decisions. The effectiveness of the control of cost depends upon proper communication through control reports from the cost accountant to the various levels of operating management. Accounting and control reports are directed to these levels of management, i.e. top management, middle management and lower level or shop floor level of management. Each management level requires data for deciding and solving various problems. The cost accountant must devise a cost system into which data are marshalled to fit the numerous problems confronting management. Therefore, the chart of accounts, which is the accountant's means of classifying costs and expenses must be closely associated with the organisation chart showing principal management position with the line of delegation of authority, responsibility and accountability. Thus, an organisation chart is essential to the development of a cost system. Analysis of costs and preparation of reports are greatly facilitated by proper division of functions generally listed under cost department. Proper coordination is also necessary with other functions closely allied with cost accounting, such as budget and data processing. These functions

should come under the supervision of the finance chief unless they report to the chief of operation directly for other reasons.

The cost department is intimately connected with the other departments in the organisation. Their relationship can be briefly established as follows :

A. **Manufacturing departments** control the scheduling, manufacturing and inspection of each job or processed products to their finished stage in terms of efficiency norms established. Costs incurred at each stage are measured and compared with the norms.

B. **Production planning, research and design department** involve cost department for cost estimates needed for each type of material, labour and machine process before a decision can be reached in accepting or rejecting a design.

C. **Personnel department** is interested to maintaining employee cost up-to-date. The wage rate and methods of remuneration agreed with the employees form the basis for computing payroll. Cost department provides all data.

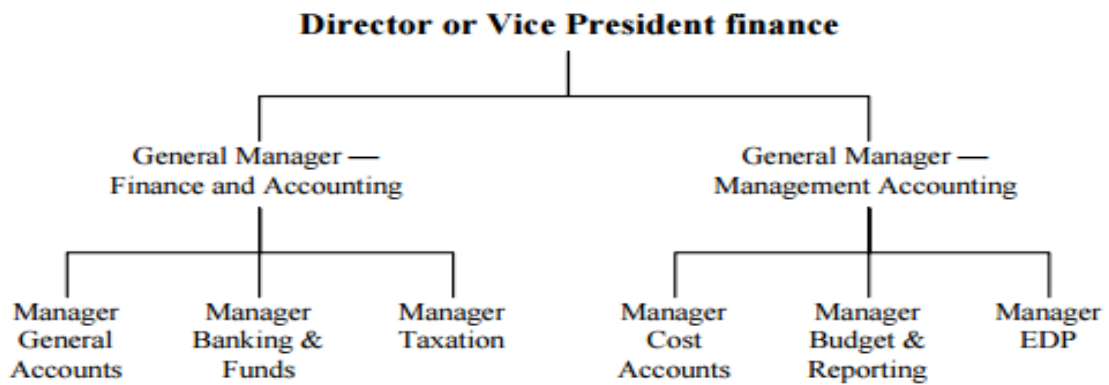
D. **Marketing department** needs a good product at a competitive price. While cost cannot determine price, it can influence fixation of price. Besides, accurate cost data help sales manager distinguish profitable with nonprofitable products and compare cost of marketing against sales volume.

E. **Public relation department** establishes good relations with the public in general and customers, creditors, shareholders, and employees in particular. The cost department provides information concerning price, cost, etc.

F. **Legal department** finds cost department helpful in keeping many affairs of the company in conformity with the law, specially excise, customs, sales tax and other legislation regarding maintenance of accounts and cost records.

G. **The finance department** relies on the cost department for accounting, valuation of inventory, cash flow statements, C.A.S. data for banks, etc. Where finance department is composed of general accounting and cost accounting, besides taxation and funds management departments, it is usual to consider cost accounting department providing unit cost of goods manufactured and sold to general accounting department. The organisation chart of a finance department usually takes the following form.





## 2.2 Installation of costing system

Having established the need for a cost department in an organisation, let us find out *the method of installation of a cost system*.

It is evident that installing a good cost system is quite a challenging task. The three fundamental requirements are as follows :

*Organisation chart* – showing the lines of authority and delegation of responsibility.

*Departmentalisation* – dividing the organisation into production and service cost centres, to which expenses are charged.

*Chart of accounts* – showing control accounts for the elements of cost as well as expense items, so as to enable collection and classification of costs both expensewise and cost centrewise.

The system requires total involvement by all the beneficiaries i.e. sales, production, engineering, purchase, personnel, quality control departments. The success of the system will finally depend on the top management which must extend full support to the system.

In actual handling of the installation work, the following technical aspects are to be carefully considered.

- to study the existing organisation chart and layout of the factory.
- to follow the production process right from the production planning, purchase and storage of materials, issues of materials to production, production process from initial till primary and secondary packing and loading on transport for distribution.
- to examine documents and reports prepared and issued by each department, including records maintained for returns furnished with the Government and outsiders.

– to interact with various levels of management to find out their expectations of the system.

Finally, the system has to be developed keeping the following factors in view :

The system should be simple and easy to operate. Complexity should be avoided

The system should give accurate, timely and adequate information.

The system should be elastic and capable of adopting to changed situation.

The system should be cost-effective. It should yield a much higher return on capital invested in installing and running the department.

### **Questions:**

1. Fill in the blanks :

(a) One of the function of RCM is proper matching of with \_\_\_\_\_ revenues.

(b) The emphasis of RCM is on \_\_\_\_\_.

(c) \_\_\_\_\_ accounting refers to the information system which provides information to managers to assist them in fulfilling organisation objectives.

2. What do you understand by departmentalisation of overheads? Why is this done? How would you departmentalise the following expenses?

(a) Consumable stores,

(b) Power

(c) Repairs and maintenance

(d) Depreciation, and

(e) Material handling expense.

3. Place RCM in management system enterprises and organizations.

**References :** Main [1, 3, 4-6]; Additional [4, 5, 10] ; Information resources

## **Topic 3. Classification of costs**

### **Topic list**

**3.1 Cost: meaning and its elements**

**3.2 Overheads: meaning**

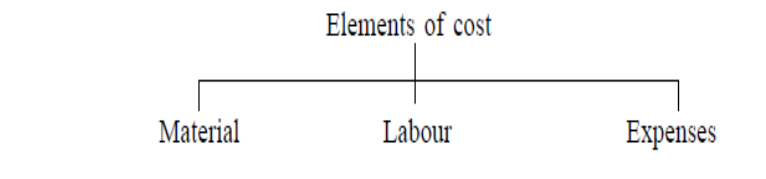
**3.3 Classification of cost**

**3.1 Cost : meaning and its elements**

*The term «cost» means the amount of expenses [actual or notional] incurred on or attributable to specified thing or activity.*

**Cost** is measurement in monetary terms of the amount of resources used for the purpose of production of goods or rendering services.

### ***Elements of cost***



### **Material**

All material which becomes an integral part of finished product and which can be conveniently assigned to specific physical unit is termed as “Direct Material”. It is also described as raw material, process material, prime material, production material, stores material, etc.

Material is classified into two categories:

- Direct Material
- Indirect Material

*Direct Material* is that material which can be easily identified and related with specific product, job, and process. Timber is a raw material for making furniture, cloth for making garments, sugarcane for making sugar, and Gold/silver for making jewellery, etc are some examples of direct material.

*Indirect Material* is that material which cannot be easily and conveniently identified and related with a particular product, job, process, and activity. Consumable stores, oil and waste, printing and stationery etc, are some examples of indirect material. Indirect materials are used in the factory, the office, or the selling and distribution department.

### **Labour**

Labour is the main factor of production. For conversion of raw material into finished goods, human resource is needed, and such human resource is termed as

labour. Labour cost is the main element of cost in a product or service. Labour can be classified into two categories:

- Direct Labour, and
- Indirect labour

*Direct labour* – labour which takes active and direct part in the production of a commodity. Direct labour is that labour which can be easily identified and related with specific product, job, process, and activity. Direct labour cost is easily traceable to specific products. Direct labour costs are specially and conveniently traceable to specific products. Direct labour varies directly with the volume of output. Direct labour is also known as process labour, productive labour, operating labour, direct wages, manufacturing wages, etc. Cost of wages paid to carpenter for making furniture, cost of a tailor in producing readymade garments, cost of washer in dry cleaning unit are some examples of direct labour.

*Indirect labour* is that labour which can not be easily identified and related with specific product, job, process, and activity. It includes all labour not directly engaged in converting raw material into finished product. It may or may not vary directly with the volume of output. Labour employed for the purpose of carrying out tasks incidental to goods or services provided is indirect labour. Indirect labour is used in the factory, the office, or the selling and distribution department. Wages of store-keepers, time-keepers, salary of works manager, salary of salesmen, etc, are all examples of indirect labour cost.

### **Expenses**

All cost incurred in the production of finished goods other than material cost and labour cost are termed as expenses. Expenses are classified into two categories:

- Direct expenses
- Indirect expenses (an item of overheads)

#### *Direct expenses*

These are expenses which are directly, easily, and wholly allocated to specific cost center or cost units. All direct cost other than direct material

and direct labour are termed as direct expenses. Direct expenses are also termed as chargeable expenses. Some examples of the direct expenses are hire of special machinery, cost of special designs, moulds or patterns, fee paid to architects, surveyors and other consultants, inward carriage and freight charges on special material, Cost of patents and royalties.

1. *Cost center* means a location, person, or item of equipment or group

of these for which costs may be ascertained and used for the purpose of cost control.

2. *Cost object* is anything for which a separate measurement of cost is desired. It may be a product, service, project, or a customer.

### *Indirect expenses*

These expenses cannot be directly, easily, and wholly allocated to specific cost center or cost units. All indirect costs other than indirect material and indirect labour are termed as indirect expenses. Indirect expenses are treated as part of overheads. Rent, rates and taxes of building, repair, insurance and depreciation on fixed assets, etc, are some examples of indirect expenses.

### **3.2 Overheads: meaning**

The term *overhead* has a wider meaning than the term indirect expenses.

**Overheads** include the cost of indirect material, indirect labour and indirect expenses.

$$\text{Overhead} = \text{Indirect material} + \text{Indirect labour} + \text{Indirect expenses}$$

Overheads are classified into following three categories:

- Factory/works/ production overheads
- Office and administrative overheads
- Selling and distribution overheads

### **Factory/works overheads**

All indirect costs incurred in the factory for production of goods is termed as factory/works overheads. Such costs are concerned with the running of the factory or plant. These include indirect material, indirect labour and indirect expenses incurred in the factory. Some examples are as follows:

#### *Indirect materials:*

Grease, oil, lubricants, cotton waste etc.

Small tools, brushes for sweeping, sundry supplies etc.

Cost of threads, gum, nails, etc.

Consumable stores

Factory printing and stationery

#### *Indirect wages*

Salary of factory manager, foremen, supervisors, clerks etc.

Salary of storekeeper

Salary and fee of factory director

### *Indirect expenses*

Rent of factory buildings and land(ii) Insurance of factory building, plant, and machinery

Municipal taxes of factory building

Depreciation of factory building, plant and machinery, and their repairs and maintenance charges

Power and fuel used in factory

Factory telephone expenses.

### **Office and administrative overheads**

They are incurred for the direction and control of an undertaking. These represent the aggregate of the cost of indirect material, indirect labour, and indirect expenses incurred by the office and administration department of an organisation. Some examples are as follows:

Office printing and stationery

Cost of brushes, dusters etc. for cleaning office building and equipments

Postage and stamps

Salary of office manager, clerks, and other employees

Salary of administrative directors

Salaries of legal adviser

Salaries of cost accountants and financial accountants

Salary of computer operator

Rent, insurance, rates and taxes of office building

Office lighting, heating and cleaning

Depreciation and

repair of office building, furniture, and Equipment etc.

Legal charges

Bank charges, Trade subscriptions, Telephone charges, Audit fee etc.

### **Selling and distribution overheads**

Selling and distribution overheads are incurred for the marketing of a commodity, for securing order for the articles, dispatching goods sold or for making efforts to find and retain customers. These expenses represent the aggregate of indirect material, indirect labour, and indirect expenses incurred by the selling and distribution department of the organisation.

These overheads have two aspects (1) procuring orders (2) executing the order. Based upon this concept the selling and distributions are studied separately.

**I. Selling overheads** Indirect costs incurred in relation to the procurement of sale orders are termed as selling overheads. Some of the examples of selling overheads are

as follows: *Indirect material*

Catalogues, price list

Printing and stationery

Postage and stamps

Cost of sample

*Indirect wages*

Salaries of sales managers, clerks and other employees

Salaries and commission of salesmen and technical representatives

Fees of sales directors

*Indirect expenses*

Advertising

Bad debts

Rent and insurance of showroom

Legal charges incurred for recovery of debts

Travelling and entertainment expenses

Expenses of sending samples

Market research expenses.

**II. Distribution overheads** Indirect costs incurred in relation to the execution of the sales order is termed as distribution overheads. Some of the examples of distribution

overheads are as follows:

*Indirect material*

Cost of packing material

Oil, grease, spare parts etc. for maintaining delivery vans

*Indirect wages*

Salaries of godown employees

Wages of drivers of delivery vans

Wages of packers and dispatch staff.

*Indirect expenses*

Packing expenses

Godown rent, insurance, depreciation, and repair etc.

Freight carriage outwards and other transport charges.

Running expenses of delivery vans, repair, and depreciation.  
Insurance in transit etc.

### **3.3 Classification of cost**

Costs are classified into following categories:

1. Cost behavior basis

(a) Fixed Cost

(b) Variable cost

(c) Semi-variable cost

2. Cost inventory basis

(a) Product cost and

(b) Period cost

3. Cost Relation to Cost Centre basis

(a) Direct and (b) Indirect costs

#### **Cost behavior basis**

##### *Fixed Cost*

A cost that remains constant within a given period of time and range of activity in spite of fluctuations in production. Per unit fixed cost varies with the change in the volume of production. If the production increases, fixed cost per unit decreases and as there is decrease in production, the fixed cost per unit increases. Rent and insurance of building, depreciation on plant and machinery, salary of employees etc., are some examples of fixed costs.

##### *Variable cost*

Variable costs are those cost which vary directly in proportion to change in volume of production/output. The cost which increases or decreases in the same proportion in which the units produced is termed as variable cost. Direct material, direct labour, direct expenses, variable overheads are some examples of variable cost.

*Variable costs, per unit same but total goes on fluctuating depending upon volume of production/level of activity.*

##### *Semi-variable cost*

A cost contains both fixed and variable component and which is thus partly affected by fluctuations in the level of activity. Semi-variable costs is that cost of which some part remains fixed at the given level of production and other part varies with the



change in the volume of production but not in the same proportion of change in production. For example, expenses may not change if output is upto 50% capacity but may increase by 5% for every 20% increase in output over 50% but up to 70%. For example, Telephone expenses of which rent portion is fixed and call charges are variable.

Semi-variable costs are segregated into fixed and variable cost by using the following formula:

$$\text{Semi-variable cost} = \text{Fixed cost} + \text{variable cost}$$

$$\text{Variable cost per unit} = \text{change in cost/change in output}$$

### **Costs by inventory**

*Product costs* are those cost which are charged and identified with the product and included in stock value. In other words, the costs that are the cost of manufacturing a product are called product cost. Product cost includes direct material, direct labour, direct expenses, and manufacturing overheads.

*Period costs* are those costs which are not charged to products but are written off as expenses against revenue of the period during which these are incurred. They are not transferred as a part of value of stock to the next accounting year. They are charged against the revenue of the relevant period. Period costs include all fixed costs and total administration, selling and distribution costs.

### **Cost Relation to Cost Centre**

*Direct costs* include all traceable costs. In the process of manufacturing of a product, materials are purchased, wages are paid to labour, and certain other expenses are also incurred directly.

The expenses incurred on those items which are not directly charged to a single product because they are incurred for many products are termed as *indirect costs*. The example of indirect costs are Oil and scrap materials, [indirect materials], salary of factory supervisors [indirect labour], rent rates and depreciation [indirect expenses]. Indirect costs, often referred to as overheads have to be apportioned to different products on suitable criterion/criteria.

The aggregate of direct materials cost, direct wages and direct expense is called **Prime cost**:

Direct material cost

Direct wages

Direct expenses

Factory variable over head

**PRIME COST**

Factory fixed over head

**COST OF SALES**

### **Questions**

1. A company manufactures and retails clothing.

You are required to group the costs which are listed below and numbered 1 to 20 into the following classifications (each cost is intended to belong to only one classification).

(1) Direct materials, (2) Direct labour, (3) Direct expenses, (4) Indirect production overhead, (5) Research and development costs, (6) Selling and distribution costs, (7) Administration costs, (8) Finance costs.

1. Lubricant for sewing machines

2. Floppy disks for general office computer

3. Maintenance contract for general office photocopying machine

4. Telephone rental plus metered calls

5. Interest on bank overdraft

6. Performing rights society charge for music broadcast throughout the factory

7. Market research undertaken prior to a new product launch

8. Wages of security guards for factory.

9. Carriage on purchases of basic raw material.

10. Royalty payable on number of units of product XY produced.

11. Road fund licences for delivery vehicles

12. Parcels sent to customers.

13. Cost of advertising products on television

14. Audit fees

15 Chief accountant's salary

16. Wages of operatives in the cutting department

17. Cost of painting advertising slogans on delivery vans

18. Wages of storekeepers in materials store

19. Wages of fork lift truck drivers who handle raw materials

20. Developing a new product in the laboratory

2. Which of the following statements are true?

(a) Direct costs are those which are identified with a particular cost centre or cost unit.

(b) Notional costs are not included for ascertaining costs.

(c) Prime cost is the total of direct material, direct labour and production expenses.

(d) Fixed costs per unit remains fixed.

3. Fill in the blanks:

(a) If an expense can be identified with a specific cost unit, it is treated as \_\_\_\_\_.

(b) Fixed costs remain fixed so long as the activity level is within the \_\_\_\_\_ range.

(c) Salary of a foreman should be classified as overheads \_\_\_\_\_.

(d) \_\_\_\_\_ refers to sudden loss in value of an asset due to change in technology.

**References :** Main [1-4, 8, 9] ; Additional [2, 6-11] ; Information resources

## **Topic 4. Calculation of cost for production**

### **Topic list**

4.1 Types of Costing Systems

4.2 Category Costing System

4.3 Process Costing Basics

### **4.1 Types of Costing Systems**

There are three major types of product costing systems :

- Category Costing System
- Job-Order Costing Systems
- Process Costing systems

*Category Costing System* according to variety cost calculation sheet, calculate the cost of each production.

*Job order costing system* estimates the costs of manufacturing products for different jobs required for specific customer orders. Applicable in organizations that treat each individual job as a single unit of output.

A *process costing system* is applicable when all units produced during a specified time frame are treated as one unit of output. Every unit made during the time period is essentially identical.

#### Distinction Between Job-Order Costing and Process Costing

- Job-order costing allocates costs to products that are identified by individual units or batches.
- Process costing averages costs over large numbers of nearly identical products.

## 4.2 Category Costing System

### Job-Cost Record

Date Started: 1/7/03			Job Number: 963		
Date Completed: 1/14/03			Units completed: 12		
Cost	Date	Ref.	Quantity	Amount	Summary
Direct Materials:					
6" Bars	1/7	N41	24	120.00	
Casings	1/9	K56	712	340.00	460.00
Direct Labor:					
Drill	1/8	7Z1	7.0	105.00	
	1/9	7Z5	5.5	82.50	
Grind	1/13	9Z2	4.0	80.00	267.50
Overhead:					
Applied	1/14		9.0 mach. hrs	180.00	180.00
Total cost					907.50
Unit cost					75.625

### General Flow of Costs: Enriquez Machine Parts Company

Beginning direct materials inventory	+ Purchases	- Direct materials used	= Ending Inventory
\$110,000	\$1,900,000	\$1,890,000	\$120,000

### General Flow of Costs: Enriquez Machine Parts Company

Beginning WIP inventory	+ Direct materials used	+Direct labor and overhead	– Cost of good smanufactured	=Ending inventory
\$0	\$1,890,000	\$765,000	\$2,500,000	155,000\$

### General Flow of Costs: Enriquez Machine Parts Company

Beginning finished goods inventory	+Cost of goods manufactured	=Cost of goods available for sale	–Cost of goods sold	=Ending inventory
\$12,000	\$2,500,000	\$2,512,000	\$2,480,000	\$32,000

### Materials Cost

Materials Inventory	
<b>110,000</b>	
<b>1,900,000</b>	
<b>2,010,000</b>	

Materials Inventory	1,900,000
Accounts Payable	1,900,000
To record purchase of direct materials	

### Materials Cost

Materials Inventory		WIP Inventory	
<b>110,000</b>	<b>1890,000</b>	1,890,000	
<b>1,900,000</b>			
<b>2,010,000</b>			

Work-in-Process Inventory	1,890,000
Materials Inventory	1,890,000
To record usage of direct materials	

### Actual Overhead Costs

Factory Department Overhead	
Control	392,000
Various Accounts	392,000
To record actual factory overhead incurred	

### Labor and Overhead Costs

Work-in-Process Inventory	390,000
Accrued Payroll	390,000
To record actual labor costs incurred	

Work-in-Process Inventory	375,000
Factory Department	
Overhead Control	375,000
To record overhead applied	

### Actual and Applied Overhead

Actual overhead	= \$392,000
Applied overhead	= \$375,000
\$392,000 – \$375,000	= \$17,000 under applied

Cost of Goods Sold	17,000
Factory Department	
Overhead Control	17,000
To dispose of underapplied overhead	

### How to Apply Factory Overhead to Products

Enriquez Machine Parts Company's budgeted manufacturing overhead for the assembly department is \$103,200.

Budgeted direct labor cost is \$206,400

What is the rate?

$$\$103,200 \div \$206,400 = 50\%$$

### How to Apply Factory Overhead to Products

Suppose that at the end of the year Enriquez has incurred \$190,000 of direct-labor cost in assembly.

How much overhead was applied to assembly?

$$\$190,000 \times 50\% = \$95,000$$

Activity-Based Costing in a Job-Order Environment	
Key activities must be identified.	
Costs in an activity center.	
Value added	Nonvalue added

### Budgets and Control of Engagements

Condensed budget:	
Revenue	\$10,000,000
Direct labor	2,500,000
Contribution to overhead and operating income	7,500,000
Overhead (all other costs)	6,500,000
Operating income	\$ 1,000,000
$\$6,500,000 \div \$2,500,000 = 260\%$	

### Accuracy of Costs of Engagements

Suppose that this accounting firm's policy for pricing is 150% of total professional costs plus travel costs.		
	Projected cost	Price

Direct labor	\$ 50,000	\$ 75,000
Applied overhead @260%	130,000	195,000
Total costs excluding travel	\$180,000	\$270,000
Travel costs	14,000	14,000
Total projected costs	\$194,000	\$284,000

### 4.3 Process Costing Basics

Process costing is more efficient for companies that produce, in a continuous process, large quantities of homogenous product

#### Process Costing Compared With Job Costing

Direct materials Direct labor Indirect resource cost	
Job 100	Job 101
Finished goods	Cost of goods sold

#### Process Costing Compared With Job Costing

Direct materials Direct labor Indirect resource cost		
Process A	Process B	Assembly
Finished goods	Cost of goods sold	

#### Process Costing Compared With Job Costing

The journal entries for process-costing systems are similar to those for the job-order system.

However there is more than one single work-in-process account.

### Five Key Steps

Step 1: Summarize the flow of physical units

Step 2: Calculate output in terms of equivalent units.

Step 3: Summarize the total costs to account for

Step 4: Calculate unit costs.

Step 5: Apply costs to units completed and to units in ending work in process.

## Physical Units and Equivalent Units

	(Step 1)	(Step 2) Equivalent units	
	Physical units	Direct materials	Conversion
Started and completed	20,000	20,000	20,000
Ending WIP	5,000	5,000	1,250
250 Units accounted for	25,000		
Work done to date		25,000	21,250
		100%	25%

## Calculation of Product Costs

	Totals	Direct materials	Conversion costs
(Step 3) Costs to account for	\$112,500	\$70,000	\$42,500
(Step 4) ÷ Equivalent units		25,000	21,250
= Unit costs		\$ 2.80	\$ 2.00
What is the cost of a completed unit?			
\$2.80+\$2.00 = 4.80			

## Production Cost Report

(Step 5) Application of costs

Units completed and transferred out:		
20,000 units @44.80		\$ 96,000
Units in ending inventory:		
Materials	5,000×2.80	14,000
Conversion	1,250 ×2.00	2,500
Total costs		\$112,500

## Journal Entries

Work-in-Process – Forming	70,000	
Direct-materials Inventory		70,000
Materials added to production during the month		
Work-in-Process – Forming	10,625	
Accrued Payroll		10,625
Direct labor during the month		

## Journal Entries

Work-in-Process – Forming	31,875	
Factory Overhead		31,875
Factory overhead applied during the month		



Work-in-Process – Finishing	96,000	
Work-in-Process– Forming		96,000
Costs of goods completed and transferred during the month from forming to assembly		

### Weighted-Average Method Example

Month ended May 31: Forming Department	
Beginning WIP: 5,000 units 100% materials 25% conversion costs	Ending WIP: 7,000 units 100% materials 60% conversion costs
Units started in May: 26,000	

### Weighted-Average Method Example

	(Step 1) Physical units	(Step 2) Equivalent units	
		Direct materials	Conversion
Beginning WIP	5,000		
Started in May	26,000		
Units to accounted for	31,000		
Completed and transferred out	24,000	24,000	34,000
Ending WIP	7,000	7,000	4,200
Units accounted for	31,000	31,000	28,200

### Weighted-Average Method Example

	Totals	Direct materials	Conversion costs
(Step 3) Beginning WIP	\$ 16,500	\$14,000	\$ 2,500
Costs added	138,820	82,100	56,720
Costs to account for	\$155,320	\$96,100	\$59,220
(Step 4) ÷ Equivalent units		31,000	28,200
= Unit costs		\$ 3.10	\$2.10

5.20 is the cost of a completed unit.

### Weighted-Average Method Example

(Step 5) Application of costs

Units completed and transferred out:	
24,000 units × \$5.20	\$124,800

Units in ending inventory:		
Materials:	$7,000 \times 3.10$	21,700
Conversion:	$4,200 \times 2.10$	8,820
Total costs		\$155,320

### FIFO Method Example

	(Step 1)	(Step 2)	
	Physical units	Equivalent units	
		Direct materials	Conversion
Beginning WIP	5,000		
Started in May	26,000		
Units to accounted for	31,000		
Completed and transferred out	24,000	24,000	24,000
Ending WIP	7,000	7,000	4,200
Units accounted for	31,000		
Work done to date		31,000	28,200
Less: Beginning WIP		5,000	1,250
Equivalent units		26,000	26,950

### FIFO Method Example

	Totals	Direct materials	Conversion costs
(Step 3) Beginning WIP	\$ 16,500	(work done before May)	
Costs added	138,820	\$82,100	\$56,720
Costs to account for	\$155,320		
(Step 4) ÷ Equivalent units		26,000	26,95
= Unit costs		\$3.1577	\$2.1046

\$5.2623 is the cost of a completed unit.

### FIFO Method Example

#### (Step 5) Application of costs

Units in ending inventory:		
Materials:	$7,000 \times 3.1577$	\$ 22,104
Conversion:	$4,200 \times 2.1046$	8,839
Total WIP (7,000 units)		\$ 30,943
Completed and transferred out		
(24,000 units), \$155,320 – \$30,943		124,377
Total costs accounted for		\$155,320

### Transferred-in Costs in Process Costing

The costs transferred from another department are similar to direct material added at the beginning of processing

## Process Costing in a JIT System

- In just-in-time production systems, inventory of work in process is typically small compared to the costs of goods produced and sold.
- The cost of tracking work in process exceeds the benefits for many companies.

## Backflush Costing

## What is backflush costing?

It is an accounting system that applies costs to products only when the production is complete.

## Principles of Backflush Costing

Backflush costing has only two categories of costs:  
Materials    Conversion  
There is no work in process account.

## Backflush Costing Example

Speaker Technology, Inc., recently introduced backflush costing and JIT.	
Model AX27 Standard material cost:	\$14
Standard conversion cost:	\$21
Actual production for the month:	400 units
Actual materials purchased:	\$5,600
Actual conversion costs:	\$8,400

## Backflush Costing Example

What are the journal entries?

Materials Inventory	5,600	
Accounts Payable or Cash		5,600
To record material purchases		
Conversion Costs	8,400	
Accrued Wages		8,400
To record conversion costs incurred		

## Backflush Costing Example

Finished Goods Inventory	14,000	
Material Inventory		5,600
Conversion Costs		8,400
To record costs of completed production		

Cost of Goods Sold	14,000	
Finished Goods Inventory		14,000
To record costs of 400 units sold		

### Backflush Costing Example

The Finished Goods Account can be eliminated.		
Cost of Goods Sold	14,000	
Material Inventory		5,600
Conversion Costs		8,400
Cost of Goods Sold	200	
Conversion Costs		200
To recognize underapplied conversion costs		

**References :** Main [1, 2, 8, 9] ; Additional [7, 10, 11] ; Information resources

## Topic 5. Analysis of costs dynamics and it's estimation.

### Topic list

5.1 Short-run cost function

5.2 Long-run cost functions

### 5.1 Short-run cost function

Since the amount of the fixed inputs is fixed, the total fixed cost will be the same regardless of the firm's output rate. Table 6.1 shows the costs of a firm in the short run. The firm's total fixed cost function is shown graphically in Figure 6.1

- Total cost (TC) is the sum of fixed cost (FC) and variable cost (VC).

$$TC = FC + VC$$

- Average fixed cost (AFC): is fixed cost divided by the quantity of output.

$$AFC = FC/Q$$

- Average variable cost (AVC): is variable cost divided by the quantity of output.

$$AVC = VC/Q$$

- Average total cost (ATC): is total cost divided by the quantity of output.

$$ATC = AFC + AVC$$

- Marginal cost (MC): is the change in total cost that results from producing an additional unit of output.

$$MC = dTC/dQ$$

Table 5.1 – Dynamics of cost in Short-run period

Q	TFC	TVC	TC	MC	AFC	AVC	ATC
0	100	0	100				
1	100	50	150	50	100.0	50	150
2	100	90	190	40	50.0	45	95.0
3	100	120	220	30	33.3	40	73.3
4	100	140	240	20	25.0	35	60.0
5	100	150	250	10	20.0	30	50.0
6	100	156	256	6	16.7	26	42.7
7	100	175	275	19	14.3	25	39.3
8	100	208	308	33	12.5	26	38.5
9	100	270	370	62	11.1	30	41.1
10	100	350	450	80	10.0	35	45.0

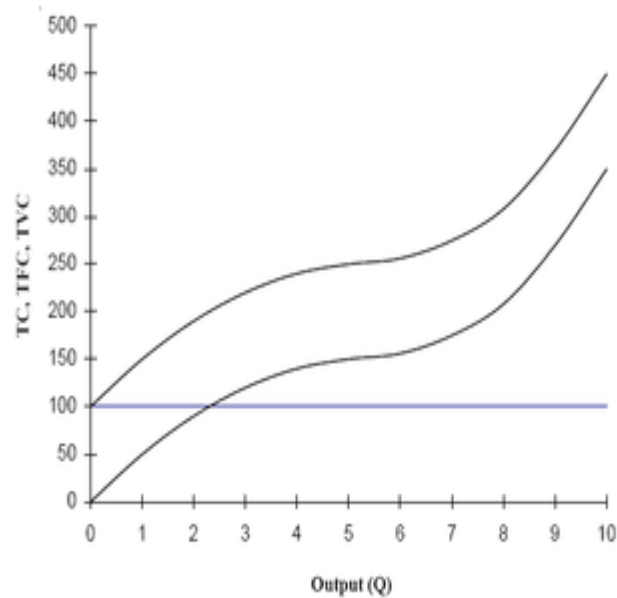


Figure 5.1 – Cost curves

Expressing the link between costs and production volume as an algebraic equation is useful. The equation for a straight line is:

$$Y = a + bx,$$

where  $Y = TC$ ,  $a = FC$ ,  $b = AVC$ ,  $x = Q$ .

The firm's total variable cost function corresponding to the data given in Table is shown graphically in Figure.

## 5.2 Long-run cost functions

The *long-run total cost function* shows the lowest total cost of producing each quantity when all factors of production are variable.

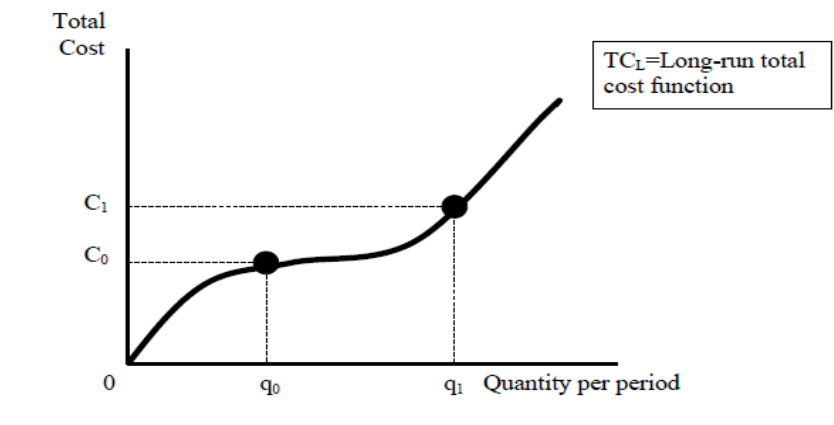


Figure 5.2 – Cost curve

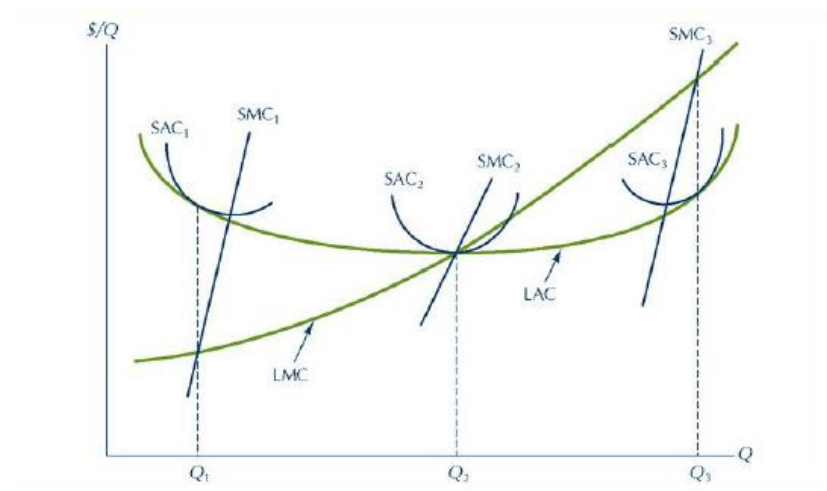


Figure 5.3 – Relationship between LAC and SAC Curves

The family of Cost Curves Associated with a U-Shaped LAC. LAC curve is the other envelope of the SAC curves. LMC – SMC at the  $Q$  value for which the SAC is tangent to the LAC. At the minimum point on the LAC,  $LMC = SMC = SAC = LAC$ . All marginal cost curves, short run and long run, intersect their corresponding average cost curves at their minimum points.

### Deriving the LAC Function from the SAC Function

In the long run a firm operates by choosing a plant size and the amount of labour that produces a quantity of product at the lowest possible total cost.

The question we will address is: “How does the firm determine its size to attain the lowest long-run total and average costs?”

### 1) The Long-Run Average Cost Function with a Limited Choice of Plants:

Suppose we have 5 plants of 5 different sizes.

Let plant 1 represent the smallest plant

Let plant 5 represent the largest plant.

Let plants 2-4 represent plants of a size in between small and large. The graph 6.4 consist of five short-run average cost functions representing the five firms' ACs.

If the firm decides to produce  $q_0$  units, the average cost of producing  $q_0$  with the first plant is lower than the second plant.

The firm should build a small firm if it chooses to produce  $q_0$ .

To find the long-run average cost from the firm's short-run average cost functions, for each quantity produced, simply move up vertically until you reach the first short-run average cost function.

The plant with *that* average cost function produces that quantity at the lowest average and total costs in the long run.

The long run average cost function becomes the *scalloped* average cost function.

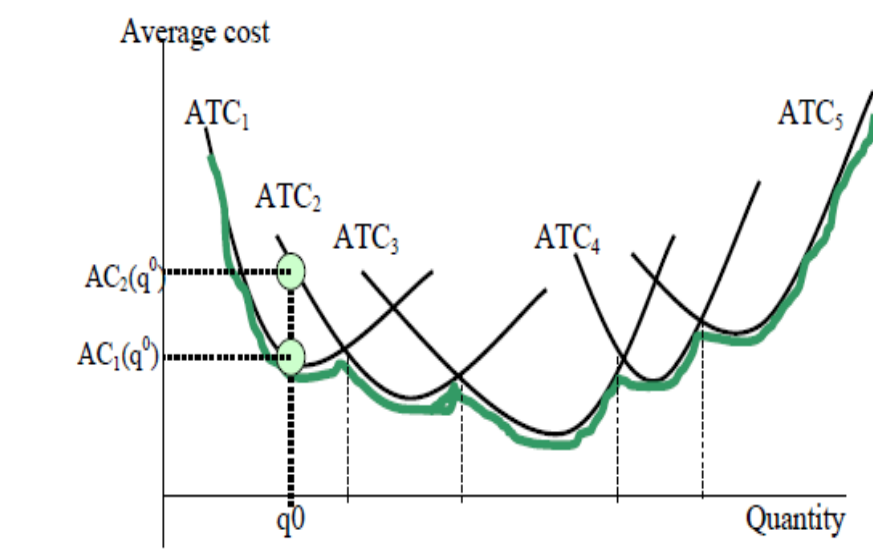
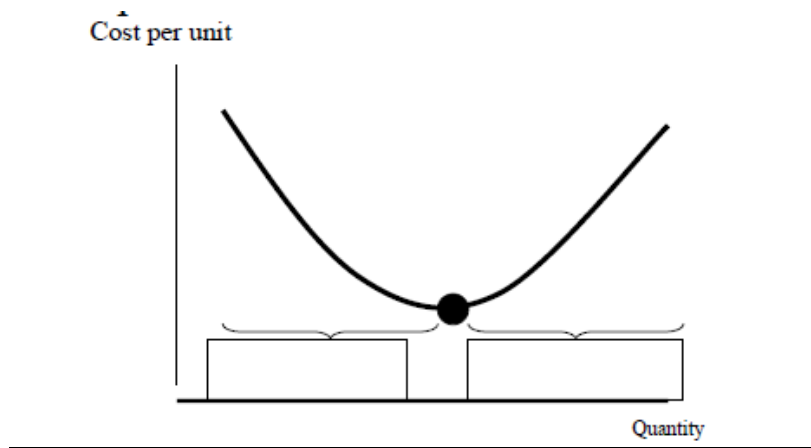


Figure 5.4 – Five short-run average cost functions representing the five firms' ACs.

## The Number of Firms and the Long-Run Cost Function

The number of firms that operate in a particular industry depends on the *shape* of the long-run average cost function. The shape places a limit on the number of firms that can efficiently operate in the market and achieve **minimum cost** of production.



When the LAC decreases, the firm is experiencing *internal economies of scale*. I.e. as output increases by increasing inputs, the average cost is falling.

Eventually, the firm will hit a minimum and any other increases in output will increase average cost. Here the firm will experience *internal diseconomies of scale*.

### Diseconomies of Scale and Industries with Many Firms

There are *indicators* whether there are internal diseconomies of scale.

Many firms, where even a large firm holds only a small market share, is an indicator that diseconomies of scale limit the size of any one firm. **Economies of Scale and Industries With Few Firms**

In some industries there are persistent economies of scale.

This is because:

- 1) Indivisibility of a factor of production: there may be a minimum level of output that the plant size cannot be scaled back to.
- 2) Volume and area connection: total cost increases less proportionately with output.
- 3) Specialization within the firm: large firms can separate tasks within the firm to operate more efficiently.

**Natural Monopoly:** a single firm can produce a given output at the lowest total cost. This occurs when a firm experiences **continual internal economies of scale**.



The total cost of producing a given quantity increases when there is more than one firm.

### Questions for review

1. The cost of flying a passenger plane from point A to point B is \$50,000. The airline flies this route four times per day at 7am, 10am, 1pm, and 4pm. The first and last flights are filled to capacity with 240 people. The second and third flights are only half full. Find the average cost per passenger for each flight. Suppose the airline hires you as a marketing consultant and wants to know which type of customer it should try to attract, the off-peak customer (the middle two flights) or the rush-hour customer (the first and last flights). What advice would you offer?

2. Determining the cost function. LLC "Comfort" for the reporting month has made 200 units. Make a calculation of the cost function for the reporting period using functional method, and calculate the total costs of the company if it increased production to 300 units, and the cost of rent at mischennya-rise at 200 USD. Analysis of the company's expenses in accordance with their reflection on accounts given in Table.

Table - Analysis of the company's cost

Elements of cost	Total cost y	Fixed cost a	Variable cost	Average variable cost b
Direct material	4000	—	4000	—
Direct wages	3000	250	2750	—
Maintenance of equipment	2230	1800	430	—
Factory overheads	900	900	—	—
Administrative	789	789	—	—
Selling and distribution	400	250	150	—
Total	11 319	3989	7330	36,65

3. The short-run cost function of a company is given by the equation  $TC=200+55Q$ , where TC is the total cost and q is the total quantity of output, both measured in thousands.

a. What is the company's fixed cost?

b. If the company produced 100,000 units of goods, what is its average variable cost?

c. What is its marginal cost per unit produced?

d. What is its average fixed cost?

e. Suppose the company borrows money and expands its factory. Its fixed cost rises by \$50,000, but its variable cost falls to \$45,000 per 1,000 units. The cost of interest (i) also enters into the equation. Each one-point increase in the interest rate raises costs by \$3,000. Write the new cost equation.

4. In long-run equilibrium, all firms in the industry earn zero economic profit. Why is this true?

5. At the beginning of the twentieth century, there were many small American automobile manufacturers. At the end of the century, there are only three large ones. Suppose that this situation is not the result of lax federal enforcement of antimonopoly laws. How do you explain the decrease in the number of manufacturers? (Hint: What is the inherent cost structure of the automobile industry?)

6. What assumptions are necessary for a market to be perfectly competitive? In light of what you have learned in this chapter, why is each of these assumptions important?

7. Suppose that a competitive firm's marginal cost of producing output  $q$  is given by  $MC(q) = 3 + 2q$ . Assume that the market price of the firm's product is \$9.

a. What level of output will the firm produce?

b. What is the firm's producer surplus?

c. Suppose that the average variable cost of the firm is given by  $AVC(q) = 3 + q$ . Suppose that the firm's fixed costs are known to be \$3. Will the firm be earning a positive, negative, or zero profit in the short run?

8. Suppose the cost function is  $C(q) = 4q^2 + 16$ .

1. Find variable cost, fixed cost, average cost, average variable cost, and average fixed cost.

2. Show the average cost, marginal cost, and average variable cost curves on a graph.

3. Find the output that minimizes average cost.

4. At what range of prices will the firm produce a positive output?

5. At what range of prices will the firm earn a negative profit?

**References :** Main [2, 4, 8]; Additional [2, 7, 11]; Information resources

## Topic 6. Relation of: costs, output, profit

### Topic list

6.1 Explanation of break-even point

6.2 The security zone of the enterprise activity.

6.3 Determination of break-even point in production of multiple types of products.

### 6.1 Explanation of break-even point

The point at which total of fixed and variable costs of a business becomes equal to its total revenue is known as *break-even point (BEP)*. Break-even point is therefore also known as no-profit, no-loss point or zero profit point. Calculation of break-even point is important for every business because it tells business owners and managers how much sales are needed to cover all fixed as well as variable expenses of the business or the sales volume after which the business will start generating profit. The computation of sales volume required to break-even is known as *break-even analysis*.

### Computation of break-even point:

#### *(1) Use of equation method:*

The application of equation method facilitates the computation of break-even point both in units and in dollars. As we have already described that the sales are equal to total variable and fixed costs at break-even point, the equation can therefore be written as follows:

$$Sp \times Q = AVc \times Q + Fc$$

or

$$SpQ = AVcQ + Fc$$

where  $Sp$  = Sales price per unit;  $Q$  = Number (quantity) of units to be manufactured and sold during the period;  $AVc$  = Variable costs to manufacture and sell a single unit of product;  $Fc$  = Total fixed costs for the period.

#### Example

A manufacturing business is involved in manufacturing and selling a single product. The annual fixed costs to run the business are \$15,000 and variable expenses

are \$7.50 per unit. The sale price of your product is \$15 per unit. The number of units to be sold to break even can be easily calculated using *equation method*:

$$15 \times Q = 7.5 \times Q + 15,000$$

$$Q = 15,000 / 7.5$$

$$Q = 2,000 \text{ units}$$

The break-even point in units is 2,000 units and the break-even point in dollars can be computed as follows:

$$= (2,000 \text{ units}) \times (\$15) = \$30,000$$

**(2) Use of contribution margin method:**

The method described above is known as *equation method of calculating break-even point*. Some people use another method called *contribution margin method*.

**Contribution margin** (CM) is equal to sales revenue less total variable expenses incurred to earn that revenue. Total variable expenses include both manufacturing and non-manufacturing variable expenses. In a service firm it is equal to revenue from provision of services less all variable expenses incurred to provide such services.

The concept can best be explained with the help of an example

*Example:*

Sales revenue = \$10,000,

Variable expenses: Manufacturing = \$4,000, Marketing and administrative = \$1,000. Fixed expenses: Manufacturing = \$2,000, Marketing and administrative = \$500.

From the above data we can calculate CM and profit as follows:

$$CM = \$10,000 - (\$4,000 + 1,000) = \$5,000$$

$$\text{Profit} = \$5,000 - (\$2,000 + \$500) = \$2,500$$

$$BEP = \frac{FC}{S_p - AVC}$$

$$BEP = 15,000 / 7.5 = 2,000 \text{ units}$$

or in UAH

$$BEP = \frac{FC}{CM_{p/U}}$$

$$= (2,000 \text{ units}) \times (\$15) = \$30,000$$

A little variation of this method is to divide the total fixed expenses by the *contribution margin ratio* (CM ratio).

$$\text{CM ratio} = (\$15 - \$7.5)/\$15$$

Doing so results in break-even point in dollars. It is shown below:

$$BEP = \frac{FC}{CM_{ratio}}$$

$$BEP = \$15,000 / 0.5 = \$30,000$$

### (3) Use of preparation of break-even chart or CVP graph:

The graphical presentation of dollar and unit sales needed to break-even is known as *break-even chart* or *CVP graph*:

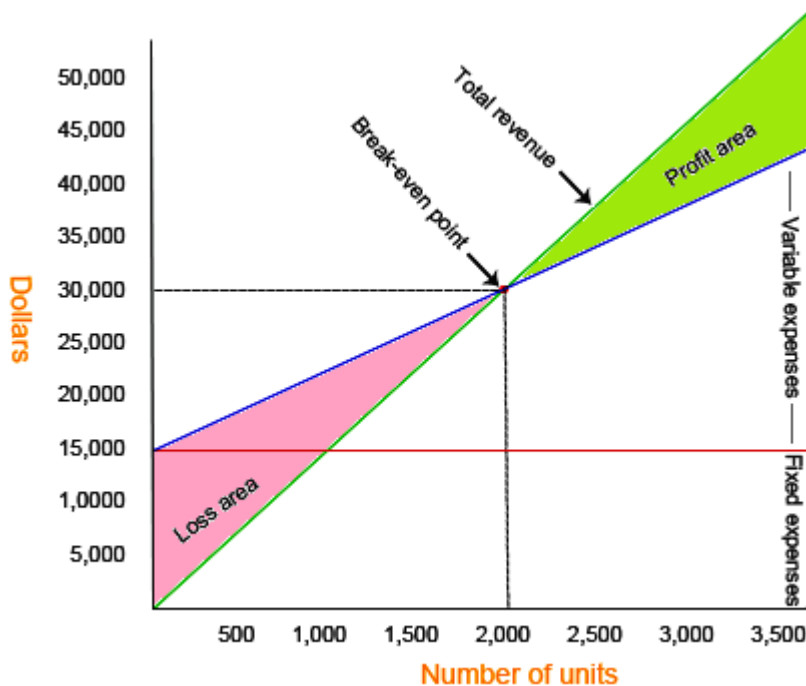


Figure 6.4 – Break-even point

#### *Explanation of the graph:*

1. The number of units have been presented on the X-axis (horizontally) where as dollars have been presented on Y-axis (vertically).
2. The straight line in red color represents the total annual fixed costs of \$15,000.

3. The blue line represents the total costs. Notice that the line has a positive or upward slop that indicates the effect of increasing variable costs with the increase in production.

4. The green line with positive or upward slop indicates that every unit sold increases the total sales revenue.

5. The total revenue line and the total costs line cross each other. The point at which they cross each other is the *break-even point*. Notice that the total costs line is above the total revenue line before the point of intersection and below after the point of intersection. It tells us that the business suffers a loss before the point of intersection and makes a profit after this point. The break-even point in the above graph is 2,000 units or \$30,000 that agrees with the break-even point computed using equation and contribution margin methods above.

6. The difference between the total costs line and the total revenue line before the point of intersection (BE point) is the *loss area*. The loss area has been filled with pink color. Notice that this area reduces as the number of units sold increases. It means every additional unit sold before the break-even point reduces the loss.

7. The difference between the total costs line and the total revenue line after the point of intersection (BE point) is the *profit area*. The profit area has been filled with green color. Notice that this area increases as the number of units sold increases. It means every additional unit sold after the break-even point increases the profit of the business.

To answer the question: how many products do you need to produce in order to obtain the planned profit ( $Pr$ ), use the following formula:

$$TR = \frac{FC + P_r}{C_{P/U}}.$$

or in UAH

$$TR = \frac{FC + P_r}{CM_{ratio}}.$$

To answer the question: what profit do you need to receive, knowing the planned TR, use the following formula o the following formula

$$Pr = TR \cdot CMR - FC.$$

## 6.2 The security zone of the enterprise activity.

The definition of so-called *security zone of the enterprise* is connected with the calculation of **margin of safety (MOS)**.

MOS is the difference between actual sales and break even sales. In other words, all sales revenue above the break-even point represents the margin of safety.

For example, if actual sales for the month of December 2015 are \$2,500,000 and the break-even sales are \$1,500,000, the difference of \$1,000,000 is margin of safety.

Margin of safety is an important figure for any business because it tells management how much reduction in revenue will result in break-even. The higher the margin of safety, the better it is. A high MOS reduces the risk of business losses.

Example:

The following data relates to Noor enterprises for the Month of June 2015.

Sales (3,500 units × \$20/unit)		\$70,00
	0	
Contribution margin per unit		\$12
Total fixed costs for the month		\$15,00
	0	

There was no opening and closing finished goods inventory in stock.

Required: Calculate margin of safety for the Noor enterprises using above data.

Margin of safety = \$70,000 – \$25,000 = \$45,000

The margin of safety of Noor enterprises is \$45,000 for the moth of June. It means if \$45,000 in sales revenue is lost, the profit will be zero and every dollar lost in addition to \$45,000 will contribute to loss.

Break-even sales \$15,000/\$12 = 1,250 units; 1250 units × \$20 = \$25000

Accordingly, the factor of safety is a relative drop in sales volumes, which may afford the company to achieve break-even point:

$$F_{MOS} = \frac{MOS}{TR}.$$

## 6.3 Determination of break-even point in production of multiple types of products.

The application of the analysis of «cost – volume – profit» is slightly more complicated terms, when the company manufactures and sells two or more products. The main problem is how to determine the break-even point of each product. A typical error in this case is the implementation of the allocation of fixed costs between the products.

The procedure of computing break-even point of a multi product company is a little more complicated than that of a single product company.

**Formula:**

A multi product company can compute its break-even point using the following formula:

$$\text{Break-even point} = \frac{\text{Total fixed expenses}}{\text{Weighted average selling price} - \text{weighted average variable expenses}}$$

For computing break-even point of a company with two or more products, we must know the sales percentage of individual products in the total sales mix. This information is used in computing weighted average selling price and weighted average variable expenses.

In the above formula, the *weighted average selling price* is worked out as follows:

(Sale price of product A × Sales percentage of product A) + (Sale price of product B × Sales percentage of product B) + (Sale price of product C × Sales percentage of product C) + .....

and the *weighted average variable expenses* are worked out as follows:

(Variable expenses of product A × Sales percentage of product A) + (Variable expenses of product B × Sales percentage of product B) + (Variable expenses of product C × Sales percentage of product C) + .....

When weighted average variable expenses per unit are subtracted from the weighted average selling price per unit, we get *weighted average contribution margin per unit*. Therefore, the above formula can also be written as follows:



$$\text{Break-even point} = \frac{\text{Total fixed expenses}}{\text{Weighted average contribution margin per unit}}$$

1. From the following data, you are required to calculate break-even point and sales value at this point:

Direct material cost per unit	10
Direct labour cost per unit	5
Fixed overhead	50 000
Variable overheads×60 % on direct labor	
Selling price per unit	25
Trade discount	4 %

If sales are 10% and 25% above the break even volume, determine the net profits.

1. From the following particulars, find out the break-even-point:

Variable cost per unit	15
Fixed expenses	54 000
Selling price per unit	20

What should be the selling price per unit, if the break-even point should be brought down to 6,000 units?

3. Calculate:

- (1) The amount of fixed expenses.
- (2) The number of units to break-even.
- (3) The number of units to earn a profit of Rs. 40,000.

The selling price per unit can be assumed at Rs. 100.

The company sold in two successive periods 7,000 units and 9,000 units and has incurred a loss of Rs. 10,000 and earned Rs. 10,000 as profit respectively.

4. A company is making a loss of Rs. 40,000 and relevant information is as follows:

Sales Rs. 1,20,000; Variable Costs Rs. 60,000; Fixed costs Rs. 1,00,000.

Loss can be made good either by increasing the sales price or by increasing sales volume. What are Break even sales if

- (a) Present sales level is maintained and the selling price is increased.

(b) If present selling price is maintained and the sales volume is increased. What would be sales if a profit of Rs. 1,00,000 is required ?

5. The Monster company manufactures three products – product X, product Y and product Z. The variable expenses and sales prices of all the products are given below:

	Product X	Product Y	Product Z
Sale per unit	\$200	\$100	\$50
Variable expenses per unit	\$100	\$75	\$25

The total fixed expenses of the company are \$50,000 per month. For the coming moth. Monster expects the sale of three products in the following ratio:

Product X: 20%; Product Y: 30%; Product Z: 50%.

Compute the break-even point of Monster company in units and dollars for the coming month.

**References :** Main [1-3, 8, 9]; Additional [2, 7] ; Information resources

## **Topic 7. Using of marginal analysis for solving of economical situations.**

### **Topic list**

7.1 The role of marginal analysis in decision making process

7.2 Accept or reject special order decision

7.3 Make-or-buy decisions

7.4 Adding or dropping segment decisions

### **7.1 The role of marginal analysis in decision making process**

**Marginal analysis** refers to an evaluation of the additional benefits of an activity contrasted to the additional costs of that activity. Marginal analysis is used by companies as a decision making tool to provide help in increasing the profits. Moreover, marginal analysis is used instinctively to make a host of everyday decisions. Also, marginal analysis is generally used in microeconomics while analyzing the complexity of a system being affected by marginal manipulation of its comprising variables.

There are three main types of decision making for enterprises:

1. Accept or reject special order decisions
2. Make-or-buy decisions

### 3. Adding or dropping segment decisions

Where making decisions the relevant information is important/

There are costs which can be changed (avoided) and costs which cannot be avoided. The first type of costs is also called relevant costs and the second type is called irrelevant costs.

Examples of relevant costs include direct labor, direct materials, variable overhead. Other costs that should be considered in this category are any incremental costs necessary for a part manufacturing. For example, if a company decides to make a part internally, but this requires the purchase of additional equipment, the cost of such equipment is relevant for the decision. In addition, sometimes making one decision or another can result in income which should be considered in the analysis; for instance, if a company decides to buy a product from a vendor and the manufacturing space frees up, it can be leased and result in income. Such income would be part of the whole make or buy decision analysis.

Examples of *irrelevant costs* are sunk costs (e.g., prior fixed asset acquisitions) and fixed overhead.

## 7.2 Accept or reject special order decision

- Frequently, the opportunity arises for management to consider an order for a quantity of its regular product at a special price (usually less than that charged regular customers). When there is excess or idle production capacity, such an offer may be attractive.
  - The firm is inclined to accept special offer because there is an idle capacity – the current operating level is below full capacity.
  - But should it be accepted at the price quotation given by the buyer or some negotiated price. Such a special order will not affect the regular sales of the same product. If there is no idle capacity, the question of special order does not arise.
  - The decision is based entirely on differential cost and the contribution margin. The real analysis of cost and revenue employs the relevant cost approach. Irrelevant items should be excluded from the analysis.
  - Fixed cost does not increase generally by accepting the special order. In other words, fixed costs typically will not change in total, whether the order is accepted or rejected. But incremental fixed cost is relevant cost. In case of variable costs, it increases by accepting the special offer.

- If the price offered is more than the marginal cost, that proposal may be accepted. But when price offered is below the marginal cost, that offer is to be rejected.
- In special order decisions, some qualitative factors need to be considered here, like the impact on future earnings, effect on existing customers, selling additional units beyond the present order, capacity expansion etc.
- Generally for making decision, here also income statement is developed which shows clearly the marginal cost, fixed cost and profit. If the profit increases on acceptance of the special order, that order should be accepted or vice versa.

Example:

A company is producing, on average, 10,000 units of product A per month despite having 30% more capacity. Costs per unit of product A are as follows:

Direct Material	\$
	8.00
Direct Labor	5
	.00
Variable Factory	2
Overhead	.00
Variable Selling	0
Expense	.50
Fixed Factory	3
Overhead	.00
Fixed Office	2
Expense	.00
	<hr/>
	\$
	20.50

The company received a special order of 2,000 units of product A at \$17.00 per unit from a new customer. Should the company accept the special order, provided that the customer has agreed to pay the variable selling expenses in addition to the price of the product?

Solution:

The increment cost per unit for the special order is calculated as:

Direct Material	\$
	8.00
Direct Labor	5
	.00
Variable Factory	2
Overhead	.00
	<hr/>
	\$

Since the incremental cost per unit is less than the price offered in the special order, the company should accept it. Accepting special order will generate additional contribution of \$2.00 unit and \$4,000 in total.

### **7.3 Make-or-buy decisions**

The higher value loses and the decision maker can go ahead with the less costly solution.

#### *Reasons for Making*

- Cost concerns
- Desire to expand the manufacturing focus
- Need of direct control over the product
- Intellectual property concerns
- Quality control concerns
- Supplier unreliability
- Lack of competent suppliers
- Volume too small to get a supplier attracted
- Reduction of logistic costs (shipping etc.)
- To maintain a backup source
- Political and environment reasons
- Organizational pride

#### *Reasons for Buying*

- Lack of technical experience
- Supplier's expertise on the technical areas and the domain
- Cost considerations
- Need of small volume
- Insufficient capacity to produce in-house
- Brand preferences
- Strategic partnerships

*Process of how businesses can make a sensible make-or-buy decision.*

#### *Step 1*

Carry out the quantitative analysis by comparing the expenses incurred in each option. The expense of purchasing products is the price paid to suppliers to purchase them. On the contrary, the cost of manufacture includes both variable and fixed

expenses. For example, a business requires 10 units of its item in 10 consecutive periods. The company can either buy the units at \$100 per unit or expend \$1,000 to set up manufacture facilities and \$8 to manufacture each unit. As the business expends \$10,000 to buy the products and \$9,000 to manufacture the same quantity of products, with respect to make-or-buy, the business would do better to manufacture the goods, on the basis of only quantitative factors.

### *Step 2*

Think about all the qualitative factors that may have a bearing on the decision to manufacture the products. This incorporates all pertinent factors that cannot be decreased to numbers such as the quality of the business' production department and its experience. An example for this is that it may be possible that the business has zero experience in manufacturing a specific good and its previous experience in manufacturing other goods cannot be applied.

### *Step 3*

Think about qualitative factors that may have a bearing on the decision to buy the products from external suppliers. Such factors include: the quality of the suppliers' management, its dependability and the quality of its goods. An example for this is that it is probable that the supplier has considerable experience in manufacturing the item being considered and the business may want to develop a long-term relationship with a supplier.

### *Step 4*

Factor the qualitative aspects into the quantitative assessment so as to complete it. An example for this in this case is that: even though it is cheaper for the business to manufacture its products, there are grounds to believe that its goods would be of a lower grade than those it can buy. In addition, as the business desires to forge a long-term relationship with its supplier, it may desire to purchase its goods from that supplier so as to commence the relationship.

### *Step 5*

Arrive at a final make-or-buy decision after considering both quantitative and qualitative factors. This would depend on the particular business and what it is doing so as to create profits. Continuing with the above example, even if it is likely that the business may buy better grade products than those it can manufacture in-house, the quality of its goods/products may not have a bearing on its sales on the basis of its business model and what it is putting on the market. If such is the case, the wish to develop a long-term relationship may or may not be adequate to prevail over the \$1,000

savings in expenses; instead it depends on how strong is the business' yearning for the relationship and what it hopes to accomplish by starting it.

Example:

Friends Company manufactures a product which requires a particular type of valves. The company currently purchases the valves from a supplier at a price of \$5 per unit. The company can also produce the valves internally. In the coming year, the company anticipates a need for 10,000 of such valves. If the company produces the valve internally, it will incur the following costs:

- Direct labor = \$1/unit
- Direct material = \$2/unit
- Variable overhead = \$0.5/unit

The manufacturing process for the valves would also require a purchase of tooling which is typically used within a year. The cost of such tooling for the 10,000 valves is \$20,000.

Based on this information, Friends Company performs the following analysis:

Cost Item	Per Unit Cost	Total Cost for 10,000 Units
Direct labor	\$1.0	\$10,000
Direct materials	\$2.0	\$20,000
Variable overhead	\$0.5	\$5,000
Annual tooling	n/a	\$20,000
Total cost		\$55,000

From the table above, it will cost \$55,000 to manufacture 10,000 valves. At the same time, it only costs \$50,000 to buy the valves from the supplier. Friends Company should continue buying the valves from the supplier.

#### **7.4 Adding or dropping segment decisions**

In deciding whether to add a new product line or drop an existing one, the management must consider relevant benefits and costs.

As a rule, product lines or business segments should be evaluated based on traceable revenues and costs. Allocated fixed costs should be removed from the analysis

of income since the company will incur in the entire amount with or without the product line or segment.

#### Example

XYZ Company has three product lines. The company is considering dropping Product 2 because it has been operating at a loss. The following summarizes the income of the three product lines.

	Product 1	Product 2	Product 3	Total
Sales	\$15,000	\$22,000	\$37,000	\$74,000
Less: Variable Costs	9,000	10,000	19,000	38,000
Contribution Margin	\$ 6,000	\$12,000	\$18,000	\$36,000
Less: Fixed Costs				
Traceable	3,000	10,000	6,000	19,000
Allocated	1,000	3,500	5,000	9,500
Net Income	\$ 2,000	(\$ 1,500)	\$ 7,000	\$ 7,500

#### Solution:

The allocated fixed costs should be removed when analyzing segment income. Hence, Product 2 should not be dropped since it has a positive segment margin.

	Product 1	Product 2	Product 3
Sales	\$15,000	\$22,000	\$37,000
Less: Variable Costs	9,000	10,000	19,000
Contribution Margin	\$ 6,000	\$12,000	\$18,000
Less: Traceable Fixed Costs	3,000	10,000	6,000
Segment Income	\$ 3,000	\$ 2,500	\$ 12,000

Why are we removing the allocated fixed costs in our analysis? Because the company would still incur the entire allocated fixed costs with or without Product 2. A portion of these costs is actually absorbed by Product 2's segment income. If Product 2 is dropped, it will result in lesser overall profits.

	With Product 2	Without Product 2
Sales	\$74,000	\$52,000
Less: Variable Costs	38,000	28,000
Contribution Margin	\$36,000	\$24,000
Less: Fixed Costs		



Traceable	19,000	9,000
Allocated	9,500	9,500
Net Income	\$ 7,500	\$ 5,500

The allocated fixed costs are unavoidable costs. The entire \$9,500 would be incurred with or without Product 2. If Product 2 is dropped, it will result in lower overall net income. Hence, the product line should not be dropped.

### Questions

1. M. company has a plant capacity of 200 000 units per month. Unit costs at capacity are:

Direct materials \$ 4,0

Direct labour \$ 6,0

Variable overhead \$ 3,0

Fixed overhead \$ 1,0

Marketing-fixed \$ 7,0

Marketing/distribution -variable \$ 3,6

Current monthly sales are 190 000 units at \$ 30,0. Q company has contacted M Corporation about purchasing 2 000 units at \$ 24,0 each. C would be current sales would not be affected by the one-time-only special order. What is M's change in operating profits if by the one-time-only special order is accepted?

2. The estimated costs of producing 6,000 units of a component are:

	P er Unit	To tal
Direct Material	\$ 10	\$6 0,000
Direct Labor	8	48 ,000
Applied Variable Factory Overhead	9	54 ,000
Applied Fixed Factory Overhead	1 2	72 ,000
<i>\$1.5 per direct labor dollar</i>		
	\$ 39	\$2 34,000

The same component can be purchased from market at a price of \$29 per unit. If the component is purchased from market, 25% of the fixed factory overhead will be saved.

Should the component be purchased from the market?

3. A company has three products: Product A, Product B and Product C. Income statements of the three product lines for the latest month are given below:

Product Line	A	B	C
Sales	\$4 67,000	\$3 14,000	\$5 98,000
Variable Costs	24 1,000	16 9,000	32 1,000
Contribution Margin	\$2 26,000	\$1 45,000	\$2 77,000
Direct Fixed Costs	91 ,000	86 ,000	11 2,000
Allocated Fixed Costs	93 ,000	62 ,000	12 0,000
Net Income	\$4 2,000	— \$3,000	\$4 5,000

Use the incremental approach to determine if Product B should be dropped.

**References :** Main [1, 4, 5, 9] ; Additional [4, 7] ; Information resources

## **Topic 8. Absorption Costing (ABC) or Direct Costing System (DC)**

### **Topic list**

8.1 Definition and explanation ABC and DC

8.2 Unit Cost Computation/Calculation

### **8.1 Definition and explanation ABC and DC**

**Absorption costing** is a costing system which treats all costs of production as product costs, regardless whether they are variable or fixed. The cost of a unit of product under absorption costing method consists of direct materials, direct labor and both variable and fixed overhead. Absorption costing allocates a portion of fixed

manufacturing overhead cost to each unit of product, along with the variable manufacturing cost. Because absorption costing includes all costs of production as product costs, it is frequently referred to as *full costing method*.

***Variable, Direct or Marginal Costing:***

**Variable costing** is a costing system under which those costs of production that vary with output are treated as product costs. This would usually include direct materials, direct labor and variable portion of manufacturing overhead. Fixed manufacturing cost is not treated as a product costs under variable costing. Rather, fixed manufacturing cost is treated as a period cost and, like selling and administrative expenses, it is charged off in its entirety against revenue each period. Consequently the cost of a unit of product in inventory or cost of goods sold under this method does not contain any fixed overhead cost. Variable costing is some time referred to as *direct costing* or *marginal costing*. To complete this summary comparison of absorption and variable costing, we need to consider briefly the handling of selling and administrative expenses. These expenses are never treated as product costs, regardless of the costing method in use. Thus under either absorption or variable costing, both variable and fixed selling and administrative expenses are always treated as period costs and deducted from revenues as incurred.

**The concepts explained so far are illustrated below**

*Cost classifications—Absorption versus variable costing*

<b>Absorption Costing</b>		<b>Variable Costing</b>
Product cost	Direct materials	Product cost
	Direct Labor	
	Variable Manufacturing overhead	
	Fixed manufacturing overhead	
Period cost	Variable selling and administrative expenses	Period cost
	Fixed selling and administrative expenses	

## 8.2 Unit Cost Computation/Calculation

Example:

A small company that produces a single product has the following cost structure.

Number of units produced	6,000
<b>Variable costs per unit:</b>	

Direct materials	\$2
Direct labor	\$4
Variable manufacturing overhead	\$1
Variable selling and Administrative expenses	\$3
<b>Fixed costs per year:</b>	
Fixed manufacturing overhead	\$30,000
Fixed selling and administrative expenses	\$10,000

Required:

1. Compute the unit product cost under absorption costing method.
2. Compute the unit product cost under variable / marginal costing method.

<b>Unit product Cost</b>	
<b>Absorption Costing Method</b>	
Direct materials	\$2
Direct labor	\$4
Variable manufacturing overhead	\$1
Total variable production cost	\$7
Fixed manufacturing overhead	\$5
Unit product cost	\$12
<b>Unit product Cost</b>	
<b>Variable Costing Method</b>	
Direct labor	\$2
Direct labor	\$4
Variable manufacturing overhead	\$1
Unit product cost	\$7
(The \$30,000 fixed manufacturing overhead will be charged off in total against income as a period expense along with selling and administrative expenses.)	

Under the absorption costing, notice that all production costs, variable and fixed, are included when determining the **unit product cost**. Thus if the company sells a unit of product and absorption costing is being used, then \$12 (consisting of \$7 variable cost and \$5 fixed cost) will be deducted on the income statement as cost of goods sold. Similarly, any unsold units will be carried as inventory on the balance sheet at \$12 each.

Under variable costing, notice that all variable costs of production are included in product costs. Thus if the company sells a unit of product, only \$7 will be deducted as cost of goods sold, and unsold units will be carried in the balance sheet inventory account at only \$7.

The income statements prepared under absorption costing and variable costing usually produce different net operating income figures. This difference can be quite large. Here we will explain the basic reason of this difference in income. The explanation for this difference needs two separate income statements one under **absorption costing** and other under **variable costing**. We will prepare two income statements that will produce different income figures and then explain the reasons of difference. Consider the following example:

Example:

Following data relates to a manufacturing company:

Number of units produced each year	6,000
<b>Variable cost per unit:</b>	\$2
Direct materials	\$4
Direct labor	\$1
Variable Manufacturing Overhead	\$3
Variable selling and Administrative expenses	
<b>Fixed costs per year:</b>	\$30,000
Fixed manufacturing overhead	\$10,000
Fixed selling and administrative expenses	
Units in beginning inventory	0
Units produced	6,000
Units Sold	5,000
Units in ending inventory	1,000
Selling price per unit	\$20
<b>Selling and administrative expenses:</b>	

Variable per unit	\$3
Fixed per year	\$10,000

**Required:**

1. Prepare income statements using:
  - a. Absorption costing system
  - b. Variable costing system
2. Prepare a reconciliation schedule

<b>Absorption Costing Income Statement</b>	
Sales (5,000 units×\$20 per unit)	\$100,000
<b>Less cost of goods sold:</b>	
Beginning inventory	\$0
Add Cost of goods manufactured (6,000 units×\$12 per unit)	\$72,000
Goods available for sale	\$72,000
Less ending inventory	\$12,000
Cost of goods sold	\$60,000
Gross Margin (\$100,000 – \$60,000)	\$40,000
<b>Less selling and administrative expenses</b>	
Variable selling and administrative expenses (5,000 × \$3 per unit)	\$15,000
Fixed selling and administrative expenses	\$10,000
	\$25,000
Net operating income (\$40,000 – \$25,000)	\$15,000

<b>Variable Costing Income Statement</b>	
Sales (5,000 units×\$20 per unit)	\$100,000
<b>Less variable expenses:</b>	
<i>Variable cost of goods sold:</i>	
Beginning inventory	\$0
Add variable manufacturing costs (1,000 units×\$7 per unit)	\$42,000
Goods available for sale	\$42,000

Less ending inventory (1,000 units×\$7 per unit)	\$7,000
Variable cost of goods sold	\$35,000
variable selling and administrative expenses (5,000 units × \$3 per unit)	\$15,000
	50,000
Contribution margin (\$100,000 – \$50,000)	50,000
<b>Less fixed expenses:</b>	
Fixed manufacturing overhead	\$30,000
Fixed selling and administrative expenses	\$10,000
	\$40,000
Net operating Income (\$50,000 – \$40,000)	\$10,000

The income statements prepared above have different net operating income figures. Now we will explain why net operating income is different under both the costing systems.

**Explanation:**

**Several points can be noted from the income statements prepared above:**

Under absorption costing if inventories increase then some of the fixed manufacturing costs of the current period will not appear on the income statement as part of cost of goods sold. Instead, these costs are deferred to a future period and are carried on the balance sheet as part of the inventory account. Such a deferral of cost is known as fixed manufacturing overhead deferred in inventory. The process involved can be explained by referring to income statements prepared above. During the current period 6,000 units have been produced but only 5,000 units have been sold leaving 1,000 unsold units in the ending inventory. Under the absorption costing system each unit produced was assigned \$5 in fixed overhead cost. Therefore each unit going into inventory at the end of the period has \$5 in fixed manufactured overhead cost attached to it, or a total of \$5,000 for 1,000 units (1,000 × \$5). This fixed manufacturing overhead cost of the current period deferred in inventory to the next period, when hopefully these units will be taken out of inventory and sold. This deferral of \$5,000 of fixed manufacturing overhead costs can be clearly seen by analyzing the ending inventory under the absorption costing method:

Variable manufacturing costs (1,000 units $\times$ \$7 per unit)	<b>\$7,000</b>
Fixed manufacturing overhead costs (1,000 units $\times$ \$5 per unit)	<b>\$5,000</b>
Total ending inventory value	<b>\$12,000</b>

In summary, under absorption costing, of the \$30,000 in fixed manufacturing overhead costs incurred during the period, only \$25,000 (5,000  $\times$  \$5 per unit) has been included in the cost of goods sold. The remaining \$5,000 (1,000 units not sold at \$5 per unit) has been deferred in inventory to the next period.

Under variable costing method the entire \$30,000 in fixed manufacturing overhead costs has been treated as an expense of the current period (see the bottom portion of the variable costing income statement).

The ending inventory figure under the variable costing method is \$5,000 lower than it is under the absorption costing method. The reason is that under variable costing; only the variable manufacturing costs are assigned to units of product and therefore included in the inventory:

Variable manufacturing costs (1,000 units  $\times$  \$7 per unit)    \$7,000

The \$5,000 difference in ending inventories explains the difference in net operating income reported between the two costing methods. Net operating is \$5,000 higher under absorption costing since, as explained above, \$5,000 of fixed manufacturing overhead cost has been deferred in inventory to the next period under that costing method. Hopefully, when the units relating to this \$5,000 fixed cost will be sold in the next period the cost attached to these units will be included in the cost of goods sold of the next period. This is called fixed manufacturing overhead cost released from inventory.

The absorption costing system makes no distinction between fixed and variable costs; therefore, it is not well suited for CVP computations, which are important for good planning and control. To generate data for cost volume profit (CVP) analysis, it would be necessary to spend considerable time reworking and reclassifying costs on the absorption statement.



The variable costing approach to costing units of product works very well with the contribution approach to the income statement, since both concepts are based on the idea of classifying costs by behavior. The variable costing data could be immediately used in cost volume profit (CVP) calculations.

**Questions:**

1. Differentiate between direct costs and direct costing.
2. Distinguish between period costs and product costs.
3. Why does the direct costing or variable costing theorist exclude fixed manufacturing costs from inventories?
4. In the process of determining a proper sales price, what kind of cost figures are likely to be most helpful?
5. Why is it said that an income statement prepared by the direct costing procedure is more helpful to management than an income statement prepared by the absorption costing method?
6. Why should the chart of accounts be expanded when direct costing is used?
7. A manufacturing concern follows the practice of charging the cost of direct materials and direct labor to work in process but charges off all indirect costs (factory overhead) directly to income summary. State the effects of this procedure on the concern's financial statements and comment on the acceptability of the procedure for use in preparing financial statements.
10. List the arguments for and against the use of direct costing.

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